Docket No.: 1614.1168C

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

Michiko ENDO

Serial No. 10/815,760 Group Art Unit:

Confirmation No.

Filed: April 2, 2004 Examiner:

For: COORDINATES INPUT APPARATUS

REMARKS RELATING TO CONTINUATION APPLICATION

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

These Remarks relate to the subject continuation application, claiming parent benefit to Application Serial No. 09/865,707 filed May 29, 2001. An Amendment filed therein on March 3, 2004 is believed sufficient to place that parent application in condition for allowance.

The FINAL Office Action in the parent prosecution, mailed December 3, 2003, rejected claims 11-22 for obviousness under 35 USC § 103(a) over Houston (USP 4,853,630).

In the following, applicants respond to those rejections and the same are respectfully traversed.

THE PRESENT INVENTION READILY DISTINGUISHES OVER HOUSTON USP '630

The Houston reference discloses a magnetic position sensor having two magnets arranged in parallel with the same pole surfaces facing each other. Four Hall elements (magnetic sensors) are mounted on one magnet so as to detect changes in the electric field intensity. That is, the magnetic sensors are positioned within a space defined between the respective, spaced poles of two magnets.

On the other hand, according to the present invention, the magnetic sensors are not positioned within a space defined between respective poles of two magnets but, instead, are

positioned in the vicinity of, but outside, a space between respective spaced poles of the respective magnets, as seen in the various different embodiments in Figs. 7 to 18.

More particularly, with regard to the embodiments of Figs. 7 and 9, the opposing magnets 12a and 14a are disposed in alignment along a common central axis and the magnetic sensors 16a and 16c (sensors 16b and 16d not shown in Fig. 7) are disposed on a supporting circuit board 18, at a radius greater than the radius of the magnets, measured from the common central axis.

In the embodiment of Fig. 12, annular magnets 12b and 14b are of a common size and shape and are spaced along a common central axis. Again, no sensors are disposed in the space between respective, opposing faces of the magnets and, instead, the sensors 16a, 16c (sensors 16b and 16d, again, not shown) are disposed at a common radius about the common central axis and within an enclosed package 34, positioned radially inwardly of the inner circumferences of the magnets 12b and 14b

In the embodiments of Figs. 14, 16, and 18, the opposing pole faces of the cylindrical magnet 14a and the annular magnet 12b (in each of Figs. 14 and 16) and of the cylindrical magnet 12a and the annular magnet 14b (in Fig. 18) are disposed with the poles or end faces radially displaced. In these embodiments, the sensors 16a, 16c (sensors 16b and 16d, again, not shown) are disposed at a common radial position from the common central axis in alignment with the end face of the annular magnet (12b in Figs. 14 and 16) or at a reduced radius in alignment with the cylindrical magnet (12a in Fig. 18).

As explained in the specification of the present application, the magnetic flux density of a magnetic field generated by two opposed magnets is higher near the edges of the magnet poles than at the centers thereof. That is, the magnetic flux is concentrated at the edges of the magnet poles. Additionally, the magnetic flux near the edge of each magnet pole extends along a parabolic line. Accordingly, the magnetic field intensity near the edges of the magnet poles changes greatly, responsive to only a slight change in the relative positions of the magnets. That is, a slight change of inclination of one of the magnets relatively to the other causes a large change in the magnetic field intensity at the position where the magnetic sensor is located. More particularly, the magnetic sensors may comprise magneto electric transducers which are disposed in a plane transverse to aligned, respective central magnetic axes of the magnets and symmetrically about those aligned axes, in a rest state of the opposed magnets. The tilting of one of the magnets relatively to the other therefore also produces a change of inclination of the tilting magnet relatively to the plane of the magneto electric transducers.

Thus, the coordinates input apparatus, according to the present invention, is capable of detecting a small change in the relative positions of the opposed magnets, which results in a sensitive position detecting sensor. Additionally, since the magnetic sensors are disposed so as to have respective lines of magnetic flux in opposing relationship, and accordingly, the two magnets can be positioned closely to each other in a direction parallel to a common axis of the magnets, with only a small gap or displacement along that common axis therebetween, a reduction in the height of the coordinates input apparatus is thereby achieved.

By contrast, in the Houston reference, the Hall effect sensors 35-38 (see Figs. 7 and 8) are positioned on the surface of the intermediate magnet 22 and thus <u>between</u> the opposing pole surfaces of the upper magnet 21 and the intermediate magnet 22, thereby requiring a greater separation, or gap, between same relatively to the reduced gap afforded by the structure of the present invention.

The pending independent claims clearly set forth this distinction and hence patentably distinguish over the Houston reference.

HOUSTON IS A "TEACHING-AWAY" FROM THE PRESENT INVENTION

Houston, in the detailed description beginning at col. 5, explains an "underlying physical phenomenon" involving a "subjacent principle whereon the sensor of the present invention is based...." (Col. 5, lines 8-13) Particularly, in Fig. 1, magnets 1 and 2 are positioned with common poles in opposing relationship such that the magnets repel each other. When a non-ferrous spacer 3 is positioned therebetween, there is a state of "unstable equilibrium." Conversely, when the spacer 3 is made of a ferrous material, the equilibrium is stable. (Col. 5, lines 8-26)

As further explained in col. 5, lines 42 et seq. (emphasis added):

> ...[I]t is believed that the lines of flux indicated by curling lines in the figure, are conducted through the ferrous spacer 3, thereby creating forces of attraction towards the center. The peripheral forces of repulsion together with the central forces of attraction exert a couple that applies the upper toroidal magnet 1 against the lower toroidal magnet 2. The equilibrium thereby obtained is surprisingly stable. It appears that the ferrous spacer 3 acts as a flux conduit, routing the flux between the two magnets. **The spacer 3 allows both the forces of attraction and repulsion to operate on the same side of the magnet.**

The first embodiment shown in Fig. 7 employs the ferrous type spherical spacer 31

aligned between the circular openings 24 and 25 in the respective, spaced first and second toroidal magnets 21 and 22. Each of the embodiments of Houston employing magnets is of this same configuration.

By contrast, applicants structure has no such spacer element and relies on forces of repulsion and not of attraction.

Note also that as seen in Fig. 8, the sensors 35-38 are formed on the surface of the lower, or second, magnet 22 at a central position of the annular surface, at a distance $(R_2+R_3)/2$ of the vertical axis of symmetry of the system. (See col. 7, lines 48-52) Hence, each of the embodiments of Houston positions the sensors in the space directly between the opposed magnets, as noted hereinabove.

By contrast, the present invention displaces the sensors from the space between opposed poles of the magnets, affording reduced height advantages, as discussed hereinabove--and altogether contrary to the structure taught by Houston.

ITEM 3 OF THE ACTION: REJECTION OF CLAIMS 11-22 FOR OBVIOUSNESS UNDER 35 USC § 103(a) OVER HOUSTON

Independent Claims 11-13

In the rejections of independent claims 11-13, the Action is silent regarding the recitations of the dimensional relationship between the annular magnet and the cylindrical magnet, as is recited in each of these independent claims.

Claim 11 clearly recites that "an inner circumference of the annular magnet is larger than an outer circumference of the cylindrical magnet", and claim 12 clearly recites that "an outer circumference of the cylindrical magnet is smaller than an inner circumference of the annular magnet." Additionally, claim 13 clearly recites that "an outer circumference of the cylindrical magnet is smaller than an inner circumference of the annular magnet." The dimensional relationship between the annular magnet and the cylindrical magnet is important, since it permits arranging the two magnets close to each other, thereby to reduce a gap formed therebetween.

These recited relationships of the magnets in the structures recited in claims 11-13 are not disclosed in the Houston reference; to the contrary, as shown above, all of the Houston embodiments employ substantially identical toridal magnets having end faces in directly opposed relationship and with the sensors disposed in the space directly therebetween.

Independent Claim 14

Regarding the independent claim 14, the Action is silent regarding the limitation that "a plurality of magnetoelectric transducers are displaced radially from the pole of at least one of the first and second magnets." This limitation is not disclosed in the Houston reference.

As discussed above, and as best seen in Fig. 8 of the Houston reference, the sensors are disposed along a circular locus, intermediate the inner and outer circular perimeters of the lower magnet 22 (see Fig. 7) in accordance with the equation at col. 7, lines 48-52, quoted and discussed hereinabove.

THE EXAMINER'S RELIANCE ON FIG. 15, IN THE SECOND PARAGRAPH OF THE REJECTION OF ITEM 3 IS UNCLEAR

In item 3, the Action asserts:

> The embodiment shown in Fig. 15 show [sic. - shows] annular shaped magnets 91, 92 (Fig. 15 at 91, 92).

(Action at page 2; inserted added)

The embodiment shown in Fig. 15 of the reference (sheet 2 of 6 of the drawings) shows "toroidal" magnets 91 and 92 (col. 11, line 64), which are identical in configuration to those of other embodiments--see, e.g., toroidal magnets 21 and 22 in Fig. 7.

It is unclear what the Examiner intends by the citation of Fig. 15; clarification is requested.

THE EXAMINER'S CONTENTIONS REGARDING ALLEGED OBVIOUSNESS OF MODIFYING THE SHAPES OF MAGNETS 21, 22, 91, 92 TO BE CYLINDRICAL OR ANNULAR IS WITHOUT BASIS AND IN ERROR

Item 3 of the Action improperly substitutes the terminology of the applicant's claims for the terminology of Houston, in characterizing the first magnet 21 as "<u>cylindrical</u>-shaped" and the second magnet 22 as "<u>annular</u>-shaped." (See item 3 at paragraph 2) To the contrary, Houston commonly, and consistently, characterizes these as <u>toroidal</u> magnets, as noted above.

Further, the "subadjacent principle" of the Houston invention requires that a "ferrous spacer 3" be disposed therebetween and which requires the existence of the circular openings 24 and 25 in those toroid magnets 21 and 22:

> Referring now to Fig. 7...sensor 20 of the present invention consists essentially of two toroidal magnets 21 and 22 spaced from each other by means of a spherical spacer 23 which seats against the circular openings 24 and 25 provided in the magnets 21 and 22. The two magnets 21 and 22 are typically identical and have therefore the same inner radius R_1, preferably 25 mm in the preferred embodiment of the present invention....The sphere 23 thus engages the openings 24 and 25 only partially, thereby assuring a space between the two magnets 21 and 22.

(Col. 6, lines 38-55)

Clearly, the proposition that the shapes of the Houston magnets 21 and 22, or 91 and 92, could be modified is without basis, since contrary to the teachings of Houston that they be "typically identical" and have the openings 24 and 25 engaging the ferrous spherical spacer 23 "thereby assuring a space between the two magnets 21 and 22."

THE ALLEGED MOTIVATION CITED IN THE ACTION IS IN ERROR

In the last three lines at page 2 of the Action, the Examiner asserts:

> The motivation for adjusting the shape would have been to facilitate improved ergonomic characteristics in a magnet tactile sensor (col. 4, lines 19-23).

(Action at page 2, last three lines)

The specification at col. 4, lines 19-23, cited by the Examiner, refers to the structure shown in Figs. 10a and 10b and discussed at col. 8, lines 38-47 of Houston. In both of these portions of Houston, relating to the structure shown in Figs. 10a and 10b, the magnets of the other embodiments are "replaced by two non-magnetic disks 52 and 53. A coil spring 54 attached to the disks...returns the two disks to their parallel stable positions...."

Hence, there is no teaching whatsoever in Houston, at col. 4, lines 19-23 or elsewhere, with regard to "adjusting the shape..."--and the Houston structure relied upon as purportedly supplying "motivation for adjusting the shape..." of the magnets is irrelevant, since not even a

"magnet tactile sensor...."

REJECTION OF CLAIMS 15-17 AT PAGE 3, OF CLAIMS 18-21 AT PAGE 4 AND OF CLAIM 21 AT PAGE 5

These rejections are based on the same deficient "readings" of the recitations of applicant's claims on the structures of Houston, as pointed out hereinabove, and the same should be withdrawn, as well.

PRIMA FACIE OBVIOUSNESS HAS NOT BEEN SHOWN AND THE EXAMINER'S RELIANCE ON WHAT ALLEGEDLY WOULD HAVE BEEN OBVIOUS TO ONE OF SKILL IN THE ART IS WITHOUT BASIS

MPEP 2144.03 defines strict standards for reliance on "official notice of facts..." when, as here, "the facts asserted to be well known are not capable of instant and unquestionable demonstration as being well known."

Applicant accordingly calls upon the Examiner to support the contentions of common knowledge or else to withdraw the contentions of obviousness underlying the rejections of the pending claims over Houston, as specified in MPEP 2144.03.

The Examiner furthermore is referred to the memorandum of Stephen G. Kunin, Deputy Commissioner for Patent Examination Policy dated February 21, 2002, copy enclosed, which provides extensive citation of the stringent standards imposed by the USPTO, which must be met to support rejections based on allegedly "well known" prior art. It is respectfully submitted that the present Action does not comply with those standards; indeed, the Action misinterprets the Houston disclosure which, clearly, is a teaching-away from the present invention.

CONCLUSION

In accordance with the foregoing, it is submitted that Houston is altogether deficient as a reference in support of the rejections of the pending claims and that those rejections should be withdrawn.

Respectfully submitted,

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